

Appendix C

NIGHT OPERATIONS

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According to FM 100-5, "Night...reduces the useful ranges of most weapons. Despite technical advances in night vision equipment, conditions usually require a change in tactics."

SECTION I. SOVIET-STYLE NIGHT DEFENSIVE DOCTRINE**Doctrine**

Inherent differences are recognized in combat operations at night. While holding that the principles of defense during day and night are the same, Soviet-style doctrine acknowledges that the methods will vary. The change in methods of night defense arises from the perception of the advantages and disadvantages of night operations.

Advantages

Advantages include using darkness to achieve surprise, conceal battle formations and fire plans, deceive the enemy as to the size of forces committed, prepare the main body for daylight actions, and repair and replenish units and positions.

Disadvantages

Disadvantages to be overcome in night operations are natural limited visibility, difficulty in orientation and maneuver, and vagueness about battlefield conditions.

Tactical Methods

The following are highlights of changes in tactical methods in night defense by battlefield operating system.

Intelligence

Reconnaissance of the enemy is increased, with the goal of gaining and maintaining contact with the main body.

The combat outpost is reinforced and will be moved in closer. Sound monitoring is initiated to prevent surprise attack by the enemy. Priority of artillery fire is given to the combat outpost.

Illumination posts will be used at both the combat outpost and the company positions. These are teams that illuminate an assigned area on order. Assets range from handheld flares to dedicated artillery support.

Maneuver

The emphasis for the night defense is on preparing weapons for aimed fire, especially those with observation devices. Numbers of antitank weapons on the FEBA are increased.

Fire planning and control are established with the goal of surprising the enemy with sudden concentrated fire. The combat outpost also will engage to stun and disrupt the enemy main body.

Fifty percent of all personnel are to remain in their positions at night, ready to open fire and repel attacks. This figure normally is 20 percent during daylight hours.

Whenever possible, the counterattack force will conduct both a daylight and night rehearsal and reconnaissance. This force is typically smaller at night than during the day. It is also deployed nearer to the main body or the area to which it is expected to be employed. The goal of the counterattack force is to defeat any penetration of the defense prior to dawn.

Fire Support

Artillery, mortars, and aviation will provide illumination for the primary purpose of exposing the enemy's first echelon, missile launchers, artillery fire positions, and approaching reserves. This line of illumination extends to the maximum tank main gun range, or to where the enemy is expected to be deployed into company columns.

An additional use of illumination is intentionally to blind the enemy's NODs. Normal illumination shells blind image intensified, incendiary shells and fire pits will wash out enemy thermal sights. The line of blinding illumination is closer to the defense than the first line of illumination or where the enemy is then expected to be in platoon formations. This is still outside the planned fire control line of the Soviet-style antitank systems; the idea is to blind first, then kill.

Mobility, Countermobility, and Survivability

Observation and patrolling of obstacles is increased at night, both to detect enemy activity and to protect the obstacle.

Air Defense

Air defense weapons are used to shoot down the enemy's illumination flares if those flares are exposing friendly troops.

Combat Service Support

Most CSS is to be carried out under the cover of darkness, to include replenishment of supplies and evacuation of the wounded.

Logistical resupply will not be conducted while in contact unless the unit will completely exhaust its ammunition and must be resupplied or be overrun.

Command and Control

"The commander's personal example plays a great role in repelling enemy attacks," said Tactika, the Soviet Union's handbook on unit level tactics. Unit commanders must overcome their soldiers' natural fear and panic in night combat operations, as well as cope with the factor of fatigue.

Plans for night defense are to be simple, based on daylight reconnaissance whenever possible. If the defense is organized at night, it should be verified and/or reorganized as soon as practicable after sunrise.

TRPs should be visible at night; if not, they will be illuminated once contact is gained.

Movement routes are to be simple and avoid the crossing of adjacent units. These routes should also be marked with illuminated signs. Movement speed will be slower in night operations.

SECTION II. US NIGHT OFFENSIVE DOCTRINE

Purpose

Night offensive operations are conducted to exploit the possibilities for security and surprise or to continue combat operations. By conducting night operations the commander expects to conceal his action from the enemy, achieve surprise, exploit earlier success, or maintain the momentum. In each case, the focus is gaining or retaining the initiative.

Advantages and Disadvantages

Advantages

Advantages of night offensive operations include the following:

- Defenses are more susceptible to infiltration.
- Despite increased efforts at protection, the defender is more susceptible to NBC attack because of reduced efficiency and sleep rotations.
- Movement of large forces is concealed by darkness.
- Physical and psychological factors favor the attacker. Shock, disorientation, and isolation are more easily achieved.
- Air assets can operate more safely due to difficult observation.
- Surprise is enhanced. Defenders are more susceptible to deception techniques (dummy lights, noise, smoke, fires).
- The speed at which a defender can employ his reserves is reduced at night. Decision points must be farther out in time and space.

Disadvantages

Disadvantages of night offensive operations include the following:

- C2 and coordination of units become more difficult and it is easier for the defender to react to a changing situation and alter operations than it is for the attacker.
- It is difficult for the attacker to determine the limits of obstacles.
- Attackers can be deceived with light, smoke, noise, and fires.
- The attacker can lose momentum during the final assault because of the reduced speed of the attack,
- Navigation is difficult for night attacks. Units may be separated, C2 lost within units, and support elements moved out of position.
- The battlefield can be changed during darkness. Obstacles that escape reconnaissance can be emplaced under darkness.
- Attacking units are easier to ambush at night.
- Adjustment of indirect fire is difficult even with the use of night vision devices or illumination.
- Units require significantly larger quantities of signal ammunition (smoke, tracers, flares, illumination rounds).
- Locating and evacuating casualties is very difficult.

Tactical Planning Considerations

The following is a list of tactical planning considerations, by battlefield operating system, that are different for a night offensive operation when compared to a daylight offensive.

Intelligence

Reconnaissance of the enemy should not be confused with reconnaissance of the routes to the objective. Units should reconnoiter their routes and rehearse if possible. Reconnaissance assets may be tasked to provide guides to a point on the battlefield, but are best used to pinpoint enemy fortifications. Reconnaissance of night objectives should include the following:

- Presence and number of searchlights and night vision devices.
- Location of illumination points.
- “Duty” positions, that is, those that are continuously manned. These may also be false positions for daylight occupation only.
- Locations of AT weapons and FA guns. These generally indicate the axes of the defense.
- Forward locations of the reserve, COP positions, and counterattack routes.

Maneuver

The forms of maneuver for the night offense are the same as for the daylight offense; however, conditions of METT-T may change the commander’s perception of which form of maneuver will best ensure mission accomplishment. Some additional planning considerations for night maneuver follow.

If attacking an enemy that has technological parity in night observation equipment and training or has the means to fully illuminate the battlefield, the envelopment or the turning movement can take advantage of darkness to flank or avoid enemy fields of fire, since not all areas of the defense will have equal coverage of night vision equipment.

Conversely, if the attacker has the advantage in night observation technology or is better trained than the defender, darkness may be used to conduct a penetration, infiltration, or frontal attack that may not have been feasible in daylight.

Unit reconnaissance of routes and axes is invaluable in conducting a night maneuver. Plans for night movement should include—

- Leader reconnaissance, in daylight, as far forward as possible.
- Measuring distances to checkpoints, phase lines, and other control symbols along the route of advance.
- Designation of guides for the combat formations.

Fire Support

The adjustment of indirect fire by human observation becomes unreliable at night. Darkness and the use of NODs both degrade depth perception. To counter these effects, plans should include the use of radar, illumination, and terminally guided munitions to ensure accuracy of adjustments.

Indirect fires can be used as a deception measure to—

- Cover the sound of advancing units.
- Draw attention with illumination or smoke to areas away from the main effort.

Illumination should always be planned for. A nonilluminated attack plan ceases to be one with the first enemy illumination round. Contingency plans should be made to illuminate at any point of the attack or to switch to continuous illumination.

Counterobservation should be planned to degrade NODs. Illumination rounds can white out enemy 12 sights, and smoke can obscure the ambient light needed to use 12 devices.

Mobility, Countermobility, and Survivability

The breaching of obstacles at night requires more time, effort, and planning. The following considerations apply:

- Securing the breach at night requires more troops.
- Obscuration planning should include covering the flash/bang of any explosive reduction method. Stealth breaches of a minefield are extremely time-consuming at night. Again, smoke generally works best at night.
- Suppression needs do not change at night. Even stealth breaches must have a plan for suppression in case they are discovered.
- Reduction of obstacles also takes much longer at night.

Man-intensive countermobility efforts require more time, effort, and planning at night. Artillery-delivered minefields are quicker and generally more accurate.

Air Defense

At night, IFF relies mostly on electronic interrogation. Visual detection capability depends on the ambient light available.

SHORAD has immense signatures; it should not be positioned where it will bring return fire onto adjacent units.

SAFAD should not normally be employed at night, except for immediate self-defense.

Combat Service Support

Units in a night offensive must be resupplied, rearmed, and refueled, before execution. Logistics activity is much tougher at night.

Casualty location, identification, and evacuation require additional control measures and ground resources. The battalion aid station should be farther forward, and plans for aeromedical evacuation must include marking signals for the pickup zones.

Pre-positioning supplies and services forward helps support night attacks. OPSEC must be maintained in such a way that an imminent offensive is not detected.

CSS should be brought forward rapidly at first light to allow for the continuation of momentum of the offensive.

Command and Control

This is the area of tactical planning that changes most during night offensive operations. That is because centralized control can more easily produce a simple, synchronous plan.

Graphic control measures are usually more restrictive for a night attack. There are graphic control measures that apply specifically to limited visibility operations: point of departure and probable line of deployment (see FM 101-5-1). All leaders *must* be familiar with these terms and symbols. All control measures should translate into easily identifiable locations on the ground, under all levels of visibility.

Navigation at night must be planned in greater detail and take advantage of visual and nonvisual technological capabilities. It may also include the use of guides and traffic control points.

Communications must also be planned in greater detail. Plans must include redundancy and multiple methods, such as wire, radio, visible and invisible light, heat, smoke, audible sound, messengers, and event-oriented communications.

SECTION III. SOVIET-STYLE NIGHT OFFENSIVE OPERATIONS

Night Offense Doctrine

Purposes

The night offensive is conducted for three primary reasons:

- Continuation of a daylight offensive.
- A separate offensive oriented on a limited objective.
- Predawn initiation of a daylight offensive.

Differences

Soviet-style leaders do not seem to stress the differences between daylight and night in the offense as much as they recognize day-night differences in the defense. They do recognize a different series of advantages and disadvantages in night offense, as opposed to daylight offense.

Advantages in conducting night offensive operations include the following:

- The attacker maintains the initiative.
- Darkness favors the attacker with surprise.
- Night allows the attacker to mass combat power and achieve objectives with minimum losses.
- Night offense raises the morale of the troops.

Disadvantages in conducting a night offensive include the following:

- Obscuration of friendly and enemy actions cannot be completely overcome by *technical equipment*; observation is difficult.
- Navigation and position-finding is difficult.
- Synchronization, or “cooperation,” is more difficult.
- C2 is difficult to maintain.
- Operating at night requires more physical and psychological effort; it causes greater personnel fatigue.

Tactical Planning Considerations

The differences between day and night operations, including the advantages and disadvantages, change tactical planning considerations for an attack at night. The following summarizes these considerations by battlefield operating system.

Intelligence

In preparing for night attack, commanders place exacting demands on their intelligence resources to determine—

- Location of nuclear attack means.
- Location of enemy positions and night observation equipment.
- Location of enemy illumination means.
- Any changes in enemy locations (reserves) made after dark.
- Location of any unsuppressed or untargeted fire means.
- Location and depth of obstacles and barriers.
- Location of any zones of contamination.

Maneuver

Night attacks are most often launched two to three hours before dawn to permit daylight exploitation.

Positive control of maneuver at night is maintained by assigning attack azimuths, cent.mil points, and guide units.

Subunit leaders are required to memorize night orders.

Vehicles and troops are marked with white or reflective materials to aid in recognition and coordination.

The reserve for an MRB in a night attack is usually a reinforced platoon.

Within the attack formation, distances between tanks, AFVs, and dismounted infantry are reduced at night, depending on the amount of illumination available. Battalion frontage may drop to as little as 1 km.

All units down to platoon level will formulate an illumination and night vision plan. This plan will designate illumination “posts” (or teams), which are the subunits tasked to illuminate with searchlights, flares, and/or IR devices.

Fire Support

Illumination is planned for any point of a night attack. Usually, it is fired continuously only on the initiation of the final assault or to defeat enemy counterattacks.

HE artillery preparation at night is normally brief but intensive, targeted on known strongpoints and firepower means.

One platoon per battery will be designated to fire illumination missions.

In preparation for a night offensive, artillery units may move within 1 to 3 km of the FEBA. This is due to the problems of displacement and surveying-in firing positions at night. Fire adjustment and target reconnaissance can be done in daylight, and firing data can be prepared in advance. If moved at night, batteries stay close to roads.

Mobility, Countermobility, and Survivability

Engineer OPs, which normally contain three men during the day, will be increased to a full squad at night. This squad will break into three teams and move forward at night to reconnoiter obstacles.

In a night march, the engineer squads ride in reconnaissance vehicles to mark and report obstacles.

Air Defense

As previously noted, air defense assets may be employed to shoot down enemy flares that are exposing troops.

Unless pre-positioned in daylight, air defense units will generally be located along roads.

Combat Service Support

Estimates call for a 15- to 30-percent increase in supply rates for a night offensive. Units are usually supplied for a night attack one or two days in advance of the actual attack.

The Soviet style is to evacuate wounded at night. Their system relies on truck ambulances, trained dogs to locate wounded, and limited aeromedical evacuation.

Command and Control

Doctrine calls for the commander to place himself center front in the night attack formation.

Commanders are also restricted by the doctrine of radio silence during the night attack.

Wire is the preferred method of communications.

SECTION IV. US NIGHT DEFENSIVE DOCTRINE

Planning and Preparation

Night defensive operations require more detailed planning and preparation than daylight operations; however, they still have the objective of seizing the initiative and destroying attacking forces.

Advantages and Disadvantages

The advantages and disadvantages of a defensive operation at night are parallel to those identified for night offensive operations in Section II of this chapter.

Tactical Planning Considerations

Tactical planning considerations for night defense do not vary greatly from those for daylight defense. By battlefield operating system, changes for conducting a night defense include the following.

Intelligence

Scouts should be assigned smaller, critical areas to observe, such as NAI and TAI.

All reconnaissance activity needs to be coordinated in detail. This precludes friendly fire and fratricide between subunits. The FSO must also monitor calls for fire to prevent one unit from engaging another.

Increased use of remote sensors and GSRs covers areas no longer visible at night.

Maneuver

Counterreconnaissance by all units is key to maintaining the integrity of the defense. Night amplifies the defender's vulnerability.

Counterattack routes must be practiced in darkness.

An observation plan for each engagement area must be set, delineating what number and mix of observation devices will be used.

Fire Support

Counterbattery fires to take away the use of illumination must be planned and supported.

FPF should be surveyed and registered in daylight.

Authority for the use of illumination by weapon type and duration should be centralized.

Smoke magnifies the effect of darkness on the attacker's formations and on his 12 devices.

Adjustment of fires will be inaccurate if only visual means are employed.

Mobility, Countermobility, and Survivability

FASCAM is more effective at night; it can be emplaced rapidly and is difficult to spot.

Engineer work time is increased as light decreases.

Engineers must be provided with security forces at night.

Sound travels farther at night. It can be used to deceive or can be covered by artillery fire.

Air Defense

Assets should be given point (critical) targets to defend, rather than area targets.

The pairing of systems with IFF capability with those that do not have it will allow both systems to engage targets.

Combat Service Support

The threat to rear areas increases at night and must be planned for.

Medical evacuation routes must be rehearsed in the dark.

Class I served between 0200 and 0400 hours counters the physiological "low" of the body.

Increases in supply rates for flares, illumination rounds, batteries, light sticks, smoke pots, wire, and general ammunition must be planned in advance.

Command and Control

Control measures are usually tighter and more restrictive at night. These include mutes to and from BPs, light lines, and no-fire zones.

Wire is the preferred communications method, followed by messenger, radio, visual signals, and event-oriented plans.

GSRs can be used to vector moving units, such as patrols, LPs/OPs, and scouts.

SECTION V. SOVIET-STYLE EQUIPMENT AND TECHNIQUES FOR NIGHT OPERATIONS

Equipment and Employment

Night Vision Equipment and Employment

Emphasis is placed on both active and passive electro-optical night operation equipment. Active systems can be operated in a passive mode to detect enemy IR illuminators and laser range finders. Their passive systems are light amplification devices that depend on ambient light from moonlight, starlight, or low levels of artificial illumination; the more light, the greater the detection and identification. However, too much intense light in the field of view of a nightsight or observation device can cause the electro-optics to “white out” and “blind” the device for several seconds; it can even cause permanent damage. (Present US 12 devices use more up-to-date technology than known Soviet-style systems and are not susceptible to total whiteout.) Soviet-style and US 12 systems have similar field-of-view characteristics, but Soviet-style systems generally require more time to detect a target because of greater distortion around the periphery of the field of view.

The array of Soviet-style IR nightsighting devices includes IR binoculars, driver’s vision blocks, and IR searchlights installed on vehicles.

Active IR devices operate on the principle of “illuminating” the target with IR rays and converting the reflection of targets into a visible image. However, since the enemy can easily detect emissions from active devices, they are used sparingly. The IR system, NSP-2, and the IR night-driving device, TVN-2, can be used either actively or passively. Used in complete darkness, these devices make it possible to identify local features, maintain observation of activities, conduct aimed fire, and drive without headlights. These devices are not effective in heavy rain or fog.

Tanks also have IR sighting equipment for the main gun and searchlights that can be IR filtered and can identify targets at ranges up to 800 meters. Tank drivers regularly use binoculars in night training, but TCs use binocular-type passive IR sensors. Ongoing modernizations are putting passive vision blocks in the driver’s hatch of BMPs and in T-64 and later series tanks.

The APN series of IR sighting equipment has a range of approximately 150 to 950 meters. It is employed on Soviet-made recoilless, antitank, and field guns of 57 to 100 mm, as well as some medium tanks. The PPN series of IR sighting devices is employed on Soviet-made light and medium machine guns of 7.62 and 12.7 mm.

Sound Monitoring

Some open source materials refer to the employment of sound-monitoring techniques and equipment. Expect sound-monitoring devices to be used, especially when night vision devices are ineffective or cannot be used for security reasons.

Thermal Imagery

There are no open source discussions on use of thermal devices. Bispectral smokes and obscurants have been developed and thermal imagery is seen as easily countered.

Land Navigation

Inventory of night navigational equipment is extensive and technically advanced. The three basic configurations are the directional gyroscopic compass, the coordinate and course indicator, and the topographical mapping system. All three systems depend on a directional gyroscope and are not susceptible to intercept, jamming, or electrical countermeasures.

Gyroscopic Compass

There are two types in the inventory, the GPK-48 and GPK-59. Both require the driver to switch the device on, warm it up, and set the heading. The GPK-48 has no built-in compensation for the rotation of the earth. The GPK-59 does; it can operate accurately for up to 90 minutes without resetting. All medium tanks and most scout vehicles (BDRMs) have these compasses.

Coordinate and Course Indicator

This device is used by artillery units to establish survey data. Average error is no more than 1.3 percent for the course covered, plus or minus 20 feet in 30 minutes.

Topographical Mapping System

Known by the nickname “the coordinator,” this device is installed in some C2 vehicles. It displays map coordinates in northings and castings, rounded off to the nearest 10 meters, and is 90 percent reliable. Once set, it can be used to navigate within a 100-kilometer grid square using map scales from 1:25,000 to 1:100,000. An improved version displays coordinates on either a 1-kilometer or 200-meter scale.

Inconsistencies and Vulnerabilities

Doctrinal Inconsistencies

Some evidence suggests that an offensive of several days’ duration in which units are committed on a 24-hour-a-day basis may not be feasible. Such a “continuous battle” does not fully conform with requirements to plan and prepare with the precision, detail, and deliberation indicated that is required to operate successfully at night. Since divisions typically operate in two echelons, it may be more likely that one echelon will be committed to daylight operations while the other prepares for night operations. In this way, the division as a whole would be operating continuously, but the subordinate units would get some relief each 24-hour period.

A sustained offensive would appear to be limited to daylight attacks by the first echelon, followed by smaller, limited objective attacks at night by second echelon units and the resumption of the offensive early in the morning of the following day with the first echelon again. Such an approach would certainly have the advantage of permitting the development of extensive nighttime expertise in those units which attack only at night. Doctrinally, once penetration is achieved, the offensive is to continue around the clock by *all* units until successful pursuit is accomplished or the offensive is terminated.

Vulnerabilities***Night Vision***

Intense light in the field of view of a Soviet-style nightsight, such as from a flare or searchlight, can blind a soldier for several seconds and could cause permanent damage to his eyesight.

Soviet-style 12 devices require a longer time to detect a target than do US devices.

Smoke will defeat Soviet-style 12 devices.

Radars

All Soviet ground radars, except the “Tall Mike” GSR, lack moving target indicators. Moving targets can be lost in ground clutter, such as wood lines and undulating terrain.

All Warsaw Pact ground radars are line-of-sight devices and can be countered by terrain shielding.

Land Navigation

Soviet-style doctrine for night attacks requires movement to final assault positions with preplanned tables of azimuths and distances, a gyrocompass, and confirmation with visual checkpoints. In this phase, forces can be forced into total reliance on the gyrocompass if checkpoints are obscured by smoke. This can greatly reduce march rates.

Several factors can disrupt the approach and the final assault. Vehicle odometers can become unreliable in rough terrain where wheel slippage occurs. The gyrocompass cannot be turned on while the vehicle is in motion; it must be warmed up for five minutes before use. Since the final assault is normally conducted dismounted on a specified azimuth, disorientation can cause forces to miss their objectives. Light, smoke, and artillery can help disorient the approach and assault.

Night movement and maneuver are vulnerable in several ways:

- The Soviet-style doctrine has a very detailed and well-planned traffic control system for movement rearward from the FLOT and for marking routes forward to it. If the route markers or guides are destroyed movement may become chaotic.
- To ensure effectiveness, artillery, air defense, and C2 units often position themselves near roads so they can reposition faster. Artillery units often move to firing positions just before sunset to lay in the guns before dark and to develop firing data.
- Nighttime reserve and counterattacking forces are smaller than their daylight counterparts and can be dealt with more easily. This should be planned for accordingly.

SECTION VI. US TECHNIQUES AND PROCEDURES FOR NIGHT OPERATIONS

This section is not intended to be an all-inclusive checklist to ensure success in night operations; it is intended to stimulate thought on better ways to ensure mission accomplishment at night. These tips are organized under general subject headings.

Land Navigation

- Odometers should be used at night to measure distances. This compensates for loss of depth perception at night.
- Field artillery PADS vehicles may be used by maneuver units to navigate at night. Place them in the movement formation.
- The optimum night road march interval when wearing night vision goggles is 25 meters.
- When traveling cross-country, tank main gun stabilization can be used to maintain general headings.
- Routes can be marked with illumination, such as chemlights, flashlights, and burning cans of diesel-soaked dirt. Place illumination so lights are visible from only the friendly side.
- The driver's 12 vision blocks are best if you are not in contact. Blinding illumination will force you to stop and drop the block, or to risk driving and fighting with the driver's view blocked from 11 o'clock to 1 o'clock or with the driver having a partially open hatch.
- Vehicle marking systems at night can use either lights or reflective panels. Chemlights can be used, with colors, patterns, or numbers indicating subunits.
- A vehicle equipped with thermal viewers can overwatch and vector forces in a desired direction.
- Radar can do the same, although the size of the cross section is smaller.
- Tracers fired at irregular intervals can delineate boundaries.
- Stars can be used for short periods of time as a heading reference. The night sky rotates, as does the moon; only the North Star is reliable enough for a constant heading.
- Even passive IR has a signature. If you spot a glow from a passive IR viewer, the operator can see you, too. Turn away and go to 12 to find the target again.

- Dominant terrain or man-made features can be used only for general orientation. The greater the distance, the more unreliable this method becomes.
- Experienced guides are the most effective night maneuver technique.

Target Engagement

- Target detection at night can be improved by illumination from a light source offset from the observer's line of sight. This produces contrasts that differ from straight-on vision and helps improve camouflage penetration.
- Interlocking sectors of night vision observation are as important as interlocking fires.
- Thermal viewers should be kept on wide field of view until engagement. This prevents gaps between systems, aids in target detection, and reduces eye strain.
- Rotate gunners and other NOD users frequently. Eye strain degrades performance rapidly.
- 12 devices can spot heat buildup in crew-served machine guns. Squad leaders with NODs should periodically glance at machine gunners to ensure that excessive heat is not building up around the breech assembly.
- 12 devices can also spot laser range finders that are pulsing. The image is a streak of light across the field of view.
- An ITV section can be used to triangulate sources of heat, and fix their grid coordinates. Accurately plot the ITV positions and true headings, take their spot reports with their turret azimuth ring readings, and do the simple intersection on the map. Accuracy increases as the baseline distance between the ITVs increases.
- TRPs should not give away your EA. Shield the source of heat or light.
- An engineer's U-shaped picket is ideal for a chemical light TRP. Face the "U" toward friendly forces with the chemlite inside the "U."
- For a thermal picket, join two 9-volt batteries at the terminals and wedge them into the "U" of the picket. These last about six hours.
- Cans of burning diesel slurry or charcoal must likewise be shielded by plywood or some other material to block transmission of the heat source to the enemy.
- Tracer rounds can be used to "illuminate" a target or area for observation by an 12 device.
- Never forget that tracers work both ways.
- During periods of thermal crossover, intensify observation efforts by other, complementary means, such as I2 binoculars, and patrols.
- Muzzle flash gives away your location. Move!
- When setting a defense at night, dead space can be determined by putting a chemlite on the back of a soldier's LBE and having him walk the weapon's range.

Fire Support

- For laying in artillery guns or mortars at night, give each gun a different lens color. Give corrections by gun color, not number.
- PADS are not only useful in surveying in the battery locations, but for surveying in critical targets as well. First-round hits eliminate the difficulty of adjustments at night.

- Illumination rounds can blind 12 devices, enemy and friendly. If you can blind the enemy and use your thermals to kill, so much the better. Put the illumination in front of, or on the ground between, the enemy and you.
- If you must put illumination in your line of sight and use your 12 to kill, keep illumination at least 300 feet off the ground before burnout. You will avoid whiteout of your 12 devices.
- Illumination and white phosphorus can be used to assist in C2. Use them to mark boundaries, designate objectives, and signal.
- Collocate your FAC and FSO. Most CAS still depends on artillery illumination to engage targets.

Air Defense

- Only the Chaparral has both IFF and night-sighting capability.
- To enhance the use of Vulcans at night, pair them with Stinger operators. The Stingers can interrogate, then the Vulcans can kill (without a large contrail signature).

Security

- Work hard at reducing noise signature. When in the defense, control vehicle start-up sounds.
- Rock-filled cans attached to barrier wire or across approach routes can provide warning of intrusion.
- Blue light is more difficult to see at night and does not destroy night vision as easily.
- Put generators into pits to hide their noise.
- To protect the perimeter, nothing replaces the roving guard on the ground.